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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,103	03/14/2001	Kazuhiro Tomita	108075-00048	2132

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EXAMINER	
SHINGLETON, MICHAEL B	
ART UNIT	PAPER NUMBER
2817	

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/805,103	TOMITA, KAZUHIRO	
	Examiner	Art Unit	
	Michael B. Shingleton	2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE Three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on July 31, 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 3-6 and 8 is/are allowed.

6)☒ Claim(s) 1, 2, and 7 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 1 is objected to because of the following informalities: In claim 1 applicant deletes "and a first grounded base amplifier that receives the first input signal and generates a second differential output signal", however, the last line of this claim does not make sense without this passage. Therefore it is assumed for examining purposes that applicant inadvertently deleted this limitation. Accordingly, the claims are merely objected to and are not considered to be unclear. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quinn Re. 31,545 (Quinn) in view of Estrada 4,945,263 (Estrada).

Figure 4 of Quinn clearly discloses a differential amplifier that receives first and second input signals (The signals directly applied to the bases of elements 100 and 102.) and generates first and second output signals (Ultimately at terminals 94 and 96.), the differential amplifier having a first single-ended differential converter including a first ground emitter amplifier (102) that receives the first input signal and generates a first differential output signal, and a first grounded base amplifier (78) that receives the first input signal and generates a second differential output signal; and a second single ended differential converter including a second ground emitter amplifier (100) that receives the second input signal and generates a third differential output signal, and a second grounded base amplifier (80) that receives the second input signal and generates a fourth differential output signal; wherein the first output signal is generated by coupling the first differential output signal and the fourth differential output signal, and the second output signal is generated by coupling the second differential output signal and the third differential output signal. In accordance with small signal analysis the grounded base amplifiers of Quinn are AC grounded just like the present invention ac grounds because of the capacitors like C2. Also note that broadest reasonable interpretation consistent with the specification includes the emitters of amplifiers 100 and 102 as connected to ground because a voltage source acts as an AC ground and the claims are not specific as to the type of ground. Also given that the voltage source must have a ground, the above

ground emitter transistors are connected to ground through the current sinks (resistors) and voltage source(s). Also note that the above description was done with Figure 4 of Quinn in mind, but applicant should also note that a similar description could be made with Figure 3A of Quinn. Figure 5 of Quinn seems to imply that the resistors 154, 156, 177 and 179 all form current sinks. Quinn, however, does not explicitly state that the current sinks 108 and 110 are resistors. Therefore Quinn is silent on the claim limitations reciting a resistor that is respectfully connected between the emitter of each of the first and second transistors and ground.

Estrada teaches that resistors (R6) are well known as current sinks in amplifier arrangements and specifically common emitter arrangements. (See column 5, around line 62).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted resistors in place of the generic current sinks of Quinn because, as the reference is silent as the exact construction of these current sinks one of ordinary skill in the art would have been motivated to use any art recognized equivalent current sink such as the resistor as taught by Estrada.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted Prior art as discussed in the specification as a "Gilbert-cell mixer" and whose general structure is shown in Figure 8 of the instant application (Note the middle paragraph on page 15 of the specification) referred to hereinafter as "AAPA" in view of Quinn Re. 31,545 (Quinn) and Estrada 4,945,263 (Estrada).

AAPA discloses the basic Gilbert-cell mixer. As applicant recognizes this mixer has a differential input wherein the accuracy of the mixer is in part dependent upon the "quality" of this first differential amplifier "20". This Gilbert-cell mixer of AAPA has all the features claimed except for the specifics on the differential amplifier that makes up the front end of the mixer (See the middle paragraph of page 15 of the instant specification.).

Figure 4 of Quinn clearly discloses a differential amplifier that receives first and second input signals (The signals directly applied to the bases of elements 100 and 102.) and generates first and second output signals (Ultimately at terminals 94 and 96.), the differential amplifier having a first differential converter including a first grounded emitter amplifier (102) that receives the first input signal and generates a first differential output signal, and a first grounded base amplifier (78) that receives the first input signal and generates a second differential output signal; and a second differential converter including a second grounded emitter amplifier (100) that receives the second input signal and generates a third differential output signal, and a second grounded base amplifier (80) that receives the second input signal and generates a fourth differential output signal; wherein the first output signal is generated by

coupling the first differential output signal and the fourth differential output signal, and the second output signal is generated by coupling the second differential output signal and the third differential output signal. Note that in accordance with small signal analysis the grounded base amplifiers of Quinn are AC grounded just like the present invention ac grounds because of the capacitors like C2. (Note that the above description was done with Figure 4 of Quinn in mind, but applicant should also note that a similar description could be made with Figure 3A of Quinn.) Quinn recognizes that the above differential arrangement results in a "high-precision amplifier" (See the abstract.). The amplifier of Quinn is clearly an art recognized equivalent differential amplifier to the front-end amplifier of a Gilbert-cell mixer and has the added advantage of being high-precision.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the conventional differential amplifier of Quinn for the conventional differential amplifier that makes up the front end amplifier in AAPA because, as the reference is silent on the exact conventional differential amplifier used for the front end amplifier, any art-recognized conventional differential amplifier would have been usable such as the well-known conventional differential amplifier of Quinn, furthermore because this would only result in the use of the differential amplifier of Quinn for it's well known and intended purpose of providing the differential amplifier function in circuits that call for such a function, still furthermore because the motivation of "high-precision" provides amble motivation to combine as this results in an overall circuit that is more high precision as taught Quinn.

Figure 5 of Quinn seems to imply that the resistors 154, 156, 177 and 179 all form current sinks. Quinn, however, is not specific that the current sinks 108 and 110 are resistors. Therefore Quinn is silent on the claim limitations reciting a resistor that is respectfully connected between the emitter of each of the first and second transistors and ground.

Estrada teaches that resistors (R6) are well known as current sinks in amplifier arrangements and specifically common emitter arrangements. (See column 5, around line 62).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted resistors in place of the generic current sinks of Quinn because, as the reference is silent as the exact construction of these current sinks one of ordinary skill in the art would have been motivated to use any art recognized equivalent current sink such as the resistor as taught by Estrada.

Allowable Subject Matter

Claims 3-6 and 8 are allowed.

Response to Arguments

Applicant's arguments with respect to claims of record have been considered but are moot in view of the new ground(s) of rejection. However, in order to try to further the present application, Applicant's arguments filed 3-17-2004 have been fully considered but they are not persuasive.

Applicant believes that the amplifiers 100 and 102 of Quinn are not "grounded emitter amplifiers". The examiner respectfully disagrees. The examiner has cited two references in support of the examiner's position. The first reference being Stengel 5,451,914. Here in Figure 1 the voltage source V_{cc} "acts as an Alternate (sic) Current (AC) ground" (See column 2, around line 12.). The other reference being Bayruns 5,047,728. Here "for alternating currents, the DC voltage source $+V_{DD}$ is at AC ground" (See column 4, around line 50). From theses two references it is clear that the voltage sources of Quinn are considered to be ground, specifically AC ground but never-the-less ground.

Applicant also states that the transistors 100, 102 of Quinn operate differently from the grounded emitter amplifiers of the claimed invention. The examiner respectfully disagrees. Applicant then goes on to describe "a relatively large input signal", "maximum currents" and how applicant believes that "it is not possible to obtain a large output signal corresponding to the large input signal, which makes it unable to improve linearity". Applicant believes the claimed invention to be different but does not point to any structure claimed that is different from Quinn. Furthermore, the examiner does not see any of the functional statements included in the claims. Accordingly, these arguments are not found persuasive.

Applicant also believes that "Quinn does not teach or suggest using a single-end differential converter that includes grounded emitter amplifiers with a single-end configuration in which two single-end amplifiers operate by differential inputs". The examiner respectfully disagrees. The specification describes elements 25 and 27 as "single end configuration". These amplifiers are common emitter amplifiers and so are the amplifiers indicated above in Quinn. These single end configuration amplifiers of Quinn are clearly operated by a differential inputs (See the above rejection.). For these reasons the examiner respectfully disagrees. Applicant goes on to cite the newly added feature of resistors connected between the emitter of these amplifiers and a ground. As indicated in the above rejection the claim is not specific as to the type of ground. Furthermore, the current sinks in Quinn are suggested to be resistors and thus applicant's arguments are found to be non-persuasive on Quinn alone, however, the above rejection cites a reference that clearly shows that resistors are considered to form a current sink in a common emitter amplifier.

Applicant submits that the rejection of claim 7 is not taught nor suggested by the applied prior art references. The examiner respectfully disagrees. As noted above the common emitters of Quinn are grounded and thus applicant is referred to the arguments above. Also while applicant does not discuss any other specific claim limitation in detail, it is noted that the newly added feature of the resistors connected between the emitters of the common emitter amplifiers has been fully addressed in the rejection above and accordingly applicant is referred to these reasonings.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael B. Shingleton whose telephone number is (571)272-1770. The examiner can normally be reached on Mon-Thurs from 8:30 to 4:30. The examiner can also be reached on alternate Fridays. The examiner normally has first Fridays of the bi-week off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal, can be reached on (571)272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MBS
September 5, 2002
March 9, 2003
April 13, 2004

Michael B Shingleton

MICHAEL B SHINGLETON
PRIMARY EXAMINER
GROUP ART UNIT 2817